

What is claimed is:

1 1. A control system for supplying a fuel to a fuel cell stack that includes an anode
2 and a cathode and generates electrical energy by a chemical reaction of the fuel, comprising:
3 a fuel storage unit that stores the fuel to be supplied to the fuel cell stack;
4 a diluent storage unit that stores a diluent that is a byproduct of the chemical reaction in
5 the fuel cell stack;
6 a sensor that detects a concentration of a fuel in a fuel mixture solution and outputs a
7 signal according to the concentration; and
8 a control unit that receives the signal from the sensor and controls the fuel mixture
9 solution.

1 2. The control system of claim 1, wherein the sensor has a portion that varies
2 volume thereof depending on the concentration of the fuel

1 3. The control system of claim 1, further comprising:
2 a fuel mixing unit that mixes the fuel supplied from the fuel storage unit and the diluent
3 supplied from the diluent storage unit.

1 4. The control system of claim 3, wherein the sensor is located in the fuel mixing
2 unit.

1 5. The control system of claim 4, wherein the sensor detects the fuel concentration
2 using characteristics that volumes of the sensor change depending on the fuel concentration.

1 6. The control system of claim 1, further comprising:
2 a line between the fuel storage unit and the diluent storage unit,
3 wherein the line supplies the fuel mixture.

1 7. The control system of claim 6, wherein the sensor is located in the line.

1 8. The control system of claim 7, wherein the sensor detects the fuel concentration
2 using characteristics that volumes of the sensor change depending on the fuel concentration.

1 9. The control system of claim 1, wherein the sensor comprises:
2 a substrate; and
3 a sensor film attached to a surface of the substrate,
4 wherein the sensor film changes volume thereof depending on the concentration of the
5 fuel in the fuel mixture solution.

1 10. The control system of claim 1, wherein the sensor comprises:
2 an external electrode;
3 an internal electrode; and
4 a sensor member that fills the space between the internal electrode and the external
5 electrode, wherein the sensor member changes volume thereof depending on the concentration of
6 the fuel mixture solution.

1 11. The control system of claim 9, wherein the sensor is manufactured using
2 polymeric ion exchange membrane or resin.

1 12. The control system of claim 10, wherein the sensor is manufactured using
2 polymeric ion exchange membrane or resin.

1 13. The control system of claim 9, wherein the sensor comprises an electronic circuit
2 that outputs an electrical signal depending on a change in the volume of the sensor.

1 14. The control system of claim 10, wherein the sensor comprises an electronic circuit
2 that outputs an electrical signal depending on a change in the volume of the pressure sensor.

1 15. The control system of claim 11, wherein the polymeric ion exchange membrane
2 or resin is one OF polystyrene sulfonic acid, poly ether ether sulfone sulfonic acid, sulfonated
3 polyolefin and sulfonated polysulfane.

1 16. The control system of claim 12, wherein the polymeric ion exchange membrane
2 or resin is one of polystyrene sulfonic acid, poly ether ether sulfone sulfonic acid, sulfonated
3 polyolefin and sulfonated polysulfane.

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1 17. A sensor for a fuel concentration in a fuel cell, comprising:
2 a substrate; and
3 a sensor film on the substrate,
4 wherein the sensor film changes volume thereof depending on a concentration of
5 fuel in fuel mixture.

1 18. The sensor of claim 17, wherein the sensor film is made of polymeric ion
2 exchange membrane or resin.

1 19. The sensor of claim 17, wherein the polymeric ion exchange membrane or resin is
2 one of polystyrene sulfonic acid, poly ether ether sulfone sulfonic acid, sulfonated ployolefin and
3 sulfonated polysulfone.

1 20. A sensor for a fuel concentration in a fuel cell comprising:
2 an external electrode;
3 an internal electrode; and
4 a sensor member that fills the space between the internal electrode and the
5 external electrode,
6 wherein the sensor member changes volume thereof depending on a concentration
7 of fuel in fuel mixture.